MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2018/2019

DCS5058 – OPERATING SYSTEMS

(DIT & DBIS)

29 MAY 2019
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

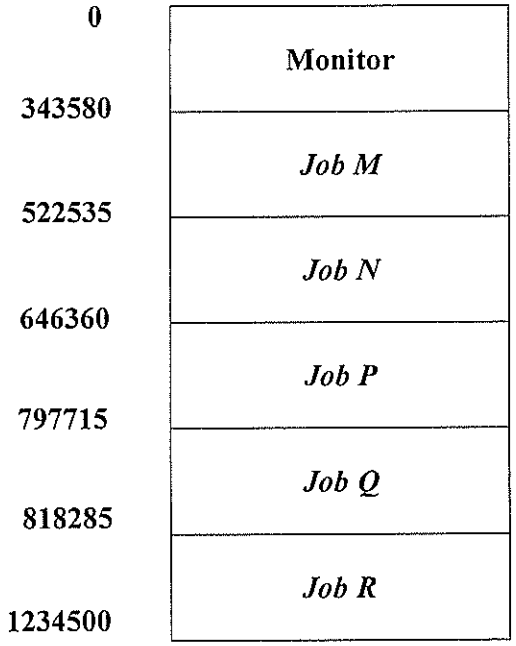
1. This question paper consists of **5** pages.
2. Answer **ALL** questions.
3. Write your answers in the answer booklet provided.

Structured Questions, 5 Questions (Total: 50 Marks)
Instruction: *Answer ALL the questions in the Answer Booklet provided.*

QUESTION 1 (10 Marks)

a) Explain the following conditions with regards to *processor point of view* in *simple batch systems*:
   i. Control is passed to a job. (1 Mark)
   ii. Control is returned to the monitor. (1 Mark)

b) Given the memory layout as below, determine the base registers and limit registers for Job M, Job P and Job R. (3 Marks)



c) "*System calls are generally available as assembly-language instructions.*"
   i. What is system call? (1 Mark)
   ii. State **TWO (2)** languages defined to replace assembly language to allow system calls to be made directly? (1 Mark)

d) One of the reasons for process suspension is swapping. Briefly explain how swapping works. (2 Marks)

e) Provide explanation for threads. (1 Mark)

Continued...

QUESTION 2 (10 Marks)

Table 1 shows the processes with the length of the CPU burst time given in milliseconds. The processes arrived according to the arrival time.

Process	Arrival Time *(ms)*	Burst Time *(ms)*	Priority
P_1	3	6	1
P_2	11	4	3
P_3	0	7	2
P_4	12	10	2
P_5	8	15	4

Table 1

Draw Gantt Charts illustrating the execution of these processes using the following scheduling algorithms. Calculate the ***waiting time*** for each process and the ***average waiting time*** for the scheduling algorithms.

i. Non-preemptive Shortest Job First. (4 Marks)

ii. Preemptive Priority. (6 Marks)

Continued...

QUESTION 3 (10 Marks)

a) Describe *hold-and-wait* deadlock prevention and list **TWO (2)** limitations if *hold-and-wait* condition is prevented. (2 Marks)

b) Consider a system with **four** processes P_1, P_2, P_3 and P_4 and **three** resource types: Resource A (6 instances), Resource B (3 instances), Resource C (5 instances).

	Resource A		**Resource B**		**Resource C**	
	Max	**Allocation**	**Max**	**Allocation**	**Max**	**Allocation**
P_1	2	1	1	0	4	0
P_2	5	3	2	0	4	2
P_3	0	0	3	0	3	1
P_4	2	0	1	1	2	1

Table 2

Available		
Resource A	**Resource B**	**Resource C**
2	2	1

Table 3

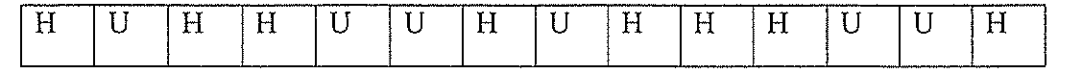
Based on the requirements, current allocations and available resources given in **Table 2** and **Table 3**, determine the content of the matrix *Need*. (1 Mark)

c) Determine if the above system is in a safe state by providing safety sequence. (7 Marks)

Continued...

QUESTION 4 (10 Marks)

a) Given a heap of memory management scheme with the following free list:



* U - Used
* H - Hole

The following process request will be received in order as in **Table 4**:

Process Number	Size in Kilobytes
P1	50
P2	32
P3	67
P4	39
P5	18

Table 4

Show how the memory requests above are allocated using the following memory allocation schemes.

i. First Fit (FF) (2.5 Marks)

ii. Worst Fit (WF) (2.5 Marks)

b) Explain memory management. (2 Marks)

c) Is fixed-size partitioning in main memory an efficient technique? Justify your answer. (3 Marks)

Continued...

QUESTION 5 (10 Marks)

a) Consider the following page reference string:

1, 3, 5, 2, 1, 6, 4, 3, 1, 5, 4, 2

Assuming a paging scheme with **FOUR (4)** frames is initially empty. Trace the allocation of pages to frames using the following page replacement algorithms:

i. First-In-First-Out (FIFO) (3 Marks)

ii. Least-Recently-Used (LRU) (3 Marks)

b) Differentiate between sequential access and direct access methods in file system. (2 Marks)

c) Name and briefly explain the file allocation method used in **Figure 1**. (2 Marks)

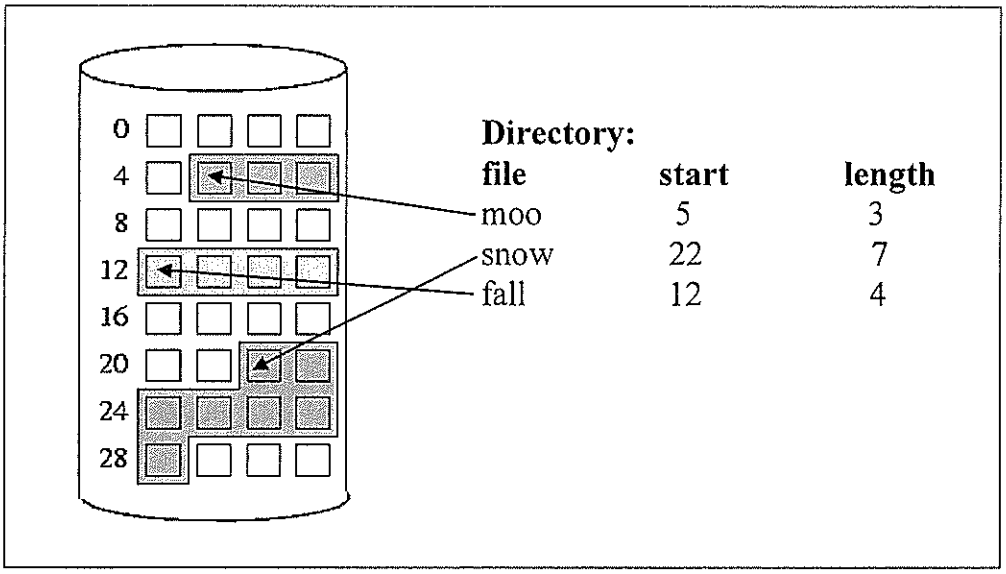


Figure 1

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